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ABSTRACT

For the last 58 years, automation has helped to enhance the library system; library operations such as circulation, cataloging, acquisitions, and serials have changed significantly due to technology. Circulation control is often the first activity a library considers automating. In addition to loan transactions, an automated circulation system can perform the following tasks: tracking of circulation materials, checking for excessive number of books checked out, detecting delinquent borrowers, printing out overdue notices, printing out fine statements, enabling rapid access to location or status of items, preparing statistical data of circulation activities, and providing a multiple branch libraries network support. Computer technology has also made a tremendous impact on cataloging. With a bibliographic utility, catalogers are able to recall and transfer a bibliographic record into their computer system where it can be edited through a maintenance feature that automatically creates a MARC record screen for librarians, and a bibliographic screen for patrons. Today, automated acquisition systems provide a close control over purchase orders and funds for printed and non-printed materials. Improvements in hardware and software design have enabled the automation of serials. Functions include ordering, receiving, renewal, and inventory control. Due to technology, libraries now have the opportunity to meet the special needs of patrons in the form of services for the handicapped, information literacy programs, and community outreach activities. (AEF)

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TECHNOLOGY'S IMPACT ON LIBRARY OPERATIONS

Doris Jui

Throughout history, inventions have helped society work more efficiently and productively. One such invention was the printing press, which enabled the production of books at lower costs. As a result, there was an increased supply of books, and a diffusion of ideas and knowledge that reached out to a greater number of people. Computer technology, like the printing press has made a major impact on society over the last several decades. The way information is now stored, manipulated, and retrieved has changed greatly due to automation. This ability has enabled libraries to automate their daily library operations. Library operations such as circulation, cataloging, acquisitions, and serials have changed significantly due to technology. Now, manual tasks once labor intensive and time consuming are being done with a few computer keystrokes.

For the last 58 years, automation has helped enhance the library system. In 1936, a punch card computer system was installed at the University of Texas for circulation control. By the mid-1940's, the University of Texas decided to experiment with its use in serial record control; and the Montclair Public Library in New Jersey, installed two circulation punch card machines, which recorded individual transactions automatically. The 1950's saw the production of a book catalog by using the punch card system at both the Library of Congress, and the King County Public Library.

During the early sixties, the availability of a general purpose computer system changed library automation, and the punch card

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systems were eventually diminished. This new computer system stored information on magnetic tapes, and was able to juggle several operations at the same time. Due to its large storage capacity, all types of information could be stored on a magnetic tape. This new development lead to the initiation of several programming projects throughout the country. Among them were MEDLARS, MARC, OCLC, and BALLOTS which is now known as RLIN. The MEDLARS project, developed by the National Library of Medicine mechanized the handling of medical literature. The Library of Congress, developers of MARC (Machine Readable Cataloging) provided a national standard format for cataloging data that was machine readable and usable on all kinds of computer systems. "The Ohio College Library Center (OCLC) and Stanford University's BALLOTS (Bibliographic Automation of Large Library Operations using Time Sharing Systems) were both designed to access most of the hundreds of thousands of cataloging records made available by Project MARC, plus additional records created by each system."[1]

Since the 1960's, technology has had some major discoveries and not only have computer hardware systems gotten better but they are also now cheaper. These improvements in data processing and the realization that the computer could be used effectively for non-numerical work lead to the rapid development of library automation systems. The development of smaller and faster computer systems has produced a vast majority of hardware and software

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[1]Stephen R. Salmon, Library Automation Systems, p. 7.

systems that all libraries can choose from in order to automate their library operations.

Compared to any other automated library operation, circulation control is often the first activity a library considers automating. Circulation control systems, developed in 1936 using punch cards, have since gone through many changes. Through the years, even though the punch card system had interfaced with more sophisticated machinery, it was diminished by 1977. Yet five years prior to the diminish of punch cards, circulation systems in Great Britain had begun to use a light pen in an off-line environment. This type of pen projected a beam of light which bounced off self adhesive labels containing patterns of bars that were unique to each borrower and book. When the pattern of bars were read, the information was stored on a magnetic tape cassette. This process then required the conversion of the stored information to a conventional magnetic tape for off-line processing. By 1974, a company named Computer Library Services, Inc. was able to link the light pens to an online circulation system. Since then, various library automation software vendors have developed circulation systems using the light beam, self adhesive bar coded labels, and a magnetic stripped identification card. In this system, a magnetic strip is on the borrower's identification card and is read by a card reader. Once the corresponding borrower's file is retrieved, a beam of infrared light is projected from a lamp or pen and then bounced off self adhesive labels which have patterns of bars. The patterned bar code is translated into a digital number.

Since every book is given a unique identification number, each loan transaction that takes place ties the data pertaining to both the borrower and the book in a rapid and accurate manner. Of course, this task is only one of the many tasks that an automated circulation system can perform. Other tasks include:

- tracking of circulation materials (ie: checkouts, checkins, renewals, traces, recalls, holds, reserves, overdues, and fines)
- checking for excessive number of books checked out and if necessary block excessive borrowing
- detecting delinquent borrowers at time of check out
- printing out overdue notices
- printing out fine statements
- enabling rapid access to location or status of an item
- preparing statistical data of circulation activities based on user defined time periods
- multiple branch libraries network support

Along with circulation control, computer technology has made a tremendous impact in the way materials are now catalogued. The amount of time taken to conduct labor intensive maintenance in a manual catalog system has decreased dramatically. Early automated cataloging experiments that date back to the 1940's involved using pre-computer equipment such as card sorters and paper-tape typewriters. It was not until the early 1960's that computers were first applied to the production of catalog cards and book catalogs. The MARC Pilot program began in 1965, and within 4 years librarians were provided with a machine readable cataloging format by 1969. These MARC records contained descriptive cataloging data which were

also available in printed form as LC printed catalogs and cards. Eventually, many organizations went on to use the MARC tapes to create large data bases of cataloged records. These organizations maintained the data bases, and offered online access to subscribing libraries. In addition to MARC, other bibliographic utilities "included OCLC, RLIN, Utlas, WLN, the AGILE III system from auto-Graphics, the Interactive Access System (IAS) from Brodart Automation, and Open DRANET from Data Research Associates."[2]

The development of several bibliographic data bases and the advancement in computer technology has simplified cataloging automation. With the use of a bibliographic utility, catalogers are able to recall and transfer a bibliographic record into their computer system. Once it is in their system, the bibliographic record can be edited through a maintenance feature that automatically creates a MARC record screen for librarians, and a bibliographic screen for patrons. This type of feature eliminates the labor intensive file maintenance associated with a card catalog. Other functions that can be handled by an automated cataloguing system are:

- input and revision of bibliographic records
- correction, addition, or deletion of cataloged records
- global subject heading editing
- original cataloging
- authority control feature

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[2]William Saffady, Introduction to Automation for Librarians, 3rd ed. p. 278.

- expansion of search parameters to keyword search or other bibliographic data
- allow the further narrowing of retrieved items by author, title, subject, keyword, language, item location, publication date, publisher, and material type
- automatic "see" and "see also" cross reference structure
- listings of newly catalogued items for any user defined time frame (ie: weekly, monthly, quarterly, etc.)
- maintenance of statistical data on inventory and activities
- gain access to another commercial database purchased by the library

In addition to automated circulation control and cataloging production, automated acquisitions systems were also developed in the late 1950's by public and academic libraries. Book orders were maintained by using keypunch equipment, sorters, and tabulating machines. The development of computers in the early sixties, which enabled batch processing allowed academic libraries to produce a computer based acquisitions systems. Other acquisitions systems followed within the next ten years, yet the popularity of an automated acquisitions system did not increase until the late seventies, since there were apparent limitations in a manual acquisitions system.

Automated acquisitions systems of today provide a close control over purchase orders, and funds for both printed and non-printed materials. This type of system eliminates the need for librarians to manually search the card catalog to verify whether or not the item is already in the collection or on order, as well as eliminate the time consuming task of typing out each order form.

In an automated system with complete and accurate holdings information, this pre-order search for an item can be done in a matter of minutes. Once an order is placed in the computer, a purchase order is automatically generated on the printer, and a bibliographic record is created showing that the item is on order. As changes take place, the system also allows for necessary revisions to the original order record. There are many other acquisition functions maintained by an automated system and they are as follows:

- integrating library fund accounting
- gaining access to outside bibliographic data bases to get an accurate bibliographic description of an item
- generating a screen for all users showing full bibliographic data and purchase date of an item once an order has been placed
- printing and controlling payment checks to vendors
- generating postcard notices to patrons stating that their item has arrived when a request has been made
- flagging overdue items from vendors and automatically print follow up notices
- canceling any outstanding orders that have not been fulfilled within a certain time frame, and automatically print a cancellation notice to the vendor
- generating vendor(s) performance reports based on number of orders, amounts paid, and delivery date
- maintaining records of the number and type of acquisitions activities that have taken place within any type of user defined time frame (ie: weekly, monthly, quarterly, annually, etc.)
- generating reports indicating the status of newly purchased items within a user defined time frame (ie: weekly, monthly, quarterly, annually, etc.)

Of all the areas in a library that can be automated, serials

is the most difficult to automate. This is due to the many variables that can change from one serial to another. Variables such as the frequency of the issue, title changes, price changes, cancellations, delays, and mergers are just a few of the many problems that exist in a serials collection. Since the 1940's, many attempts have been made to automate this area. Unfortunately, due to the lack of technology, and poor software design "each system failed to handle more than the simple production of a periodical holdings list."[3]

The many improvements in hardware and software design have enabled the automation of serials. Today, an automated serials systems can perform many operations. These include functions such as ordering, receiving, renewal, and inventory control. The following is a list of the many tasks that are performed by an automated serials system:

- checking in expected or unexpected serial issues
- modifying serial information (ie: title change, mergers, discontinuation, etc.)
- generating routing slips for serials that are routinely routed to departments
- generating claim letters to publishers for overdue issues
- listing the serials that are to be sent to binding on a user defined time frame
- creating special lists of serials (ie: existing, stolen, withdrawn, vandalized, or replacement serials)
- producing a list of titles to be renewed

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[3]Stephen R. Salmon, Library Automation Systems, p. 148.

- maintaining financial records of serial purchases
- producing reports indicating expenditures by department or subject
- allowing patrons to search for serials by title, subject or keyword

The technology that has automated library operations has proven to assist librarians and their staff in accomplishing and fulfilling the tasks set for them by their users and their governing bodies. With this technology, not only are library tasks getting done better, but also they are getting done faster. Manual tasks in the areas of circulation, cataloging, acquisitions, and serials no longer require labor intensive maintenance. Without a doubt, technology has offered new and improved services for both the librarians, and the patrons of the library.

As library tasks are being done better and faster due to technology, librarians and their staff will now have additional time to examine, and deal with other issues. In an age where the needs of the underserved are being met very slowly, libraries now have the opportunity to put their time and energy to meet those needs in the form of services for the handicapped, information literacy programs, and community outreach activities. These many possibilities not previously considered may now become a reality due to technology.

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